U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB-285 704

Glendo Reservoir Converse and Platte Counties, Wyoming

National Eutrophication Survey, Corvallis, Oreg

Prepared for

Corvallis Environmental Research Lab, Oreg

Jun 78

PB 285 704

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON
and
ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

699-440

REPORT

ON

GLENDO RESERVOIR

CONVERSE AND PLATTE COUNTIES

WYOMING

EPA REGION VIII

WORKING PAPER No. 887

WITH THE COOPERATION OF THE

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY

AND THE

WYOMING NATIONAL GUARD

JUNE, 1978

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.
3. RECIPIENT'S ACCESSION NO.	PB285704
4. TITLE AND SUBTITLE	Report on Glendo Reservoir, Converse and Platte Counties, Wyoming
5. REPORT DATE	Prepared June 1978
6. PERFORMING ORGANIZATION CODE	
7. AUTHOR(S)	Anonymous (National Eutrophication Survey Staff)
8. PERFORMING ORGANIZATION REPORT NO.	Working Paper # 887
9. PERFORMING ORGANIZATION NAME AND ADDRESS	Pacific Northwest Environmental Research Laboratory U.S. Environmental Protection Agency 200 S. W. 35th St. Corvallis, Oregon 97330
10. PROGRAM ELEMENT NO.	1BA029
11. CONTRACT/GRANT NO.	
12. SPONSORING AGENCY NAME AND ADDRESS	Office of Research and Development U.S. Environmental Protection Agency 401 M Street, S. W. Washington, DC 20460
13. TYPE OF REPORT AND PERIOD COVERED	Final - 1975
14. SPONSORING AGENCY CODE	

15. SUPPLEMENTARY NOTES

Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading	National Eutrophication Survey Lake Survey	05B 05C

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release Unlimited	Unclassified	48
	20. SECURITY CLASS *(This page)*	22. PRICE
		A03-A01

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Wyoming Department of Environmental Quality for professional involvement, to the Wyoming National Guard for conducting the tributary sampling phase of the Survey, and to those Wyoming wastewater treatment plant operators who voluntarily provided effluent samples.

The staff of the Water Quality Division provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

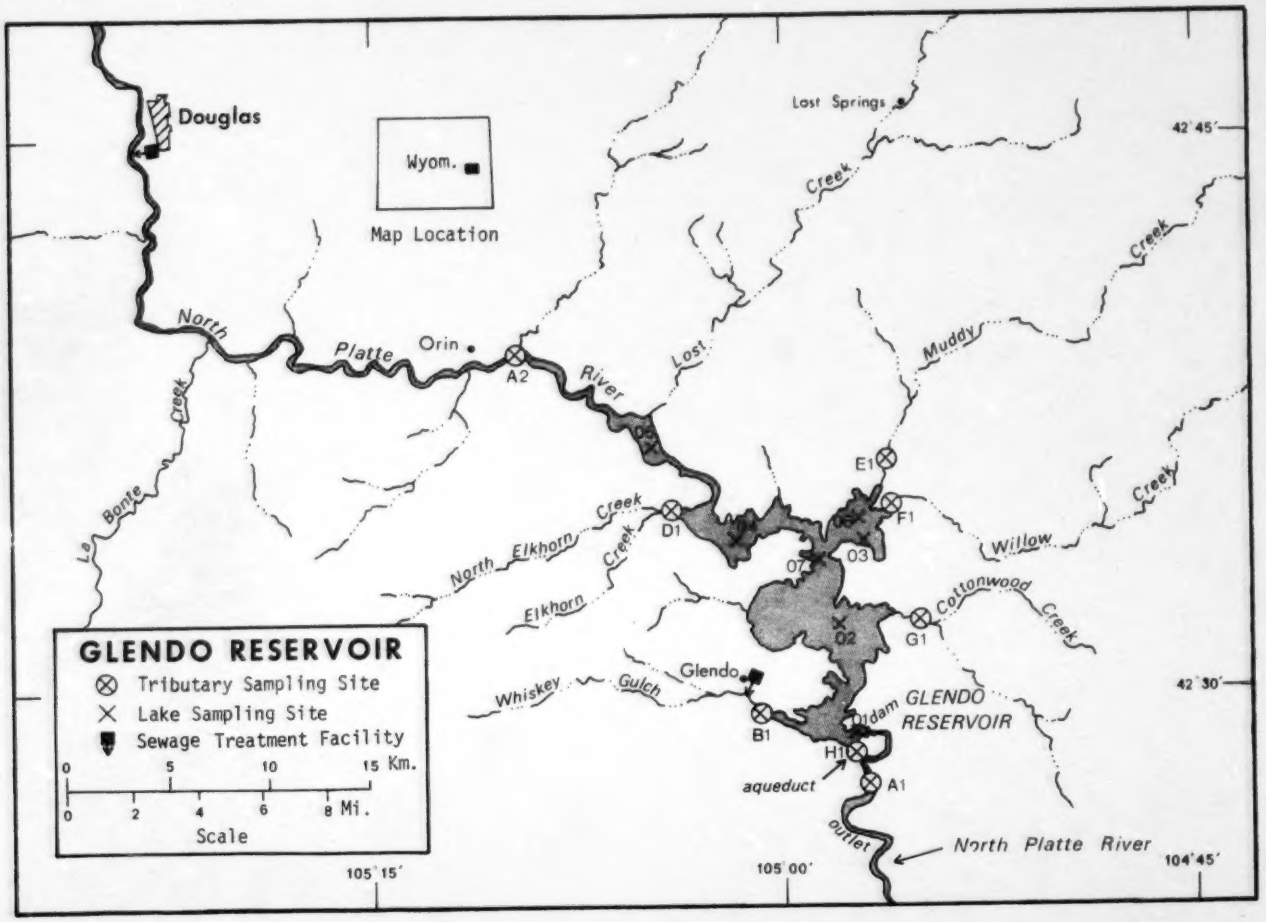
Brigadier General James L. Spence, The Adjutant General of Wyoming, and Project Officer Colonel Donald L. Boyer, who directed the volunteer efforts of the Wyoming National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

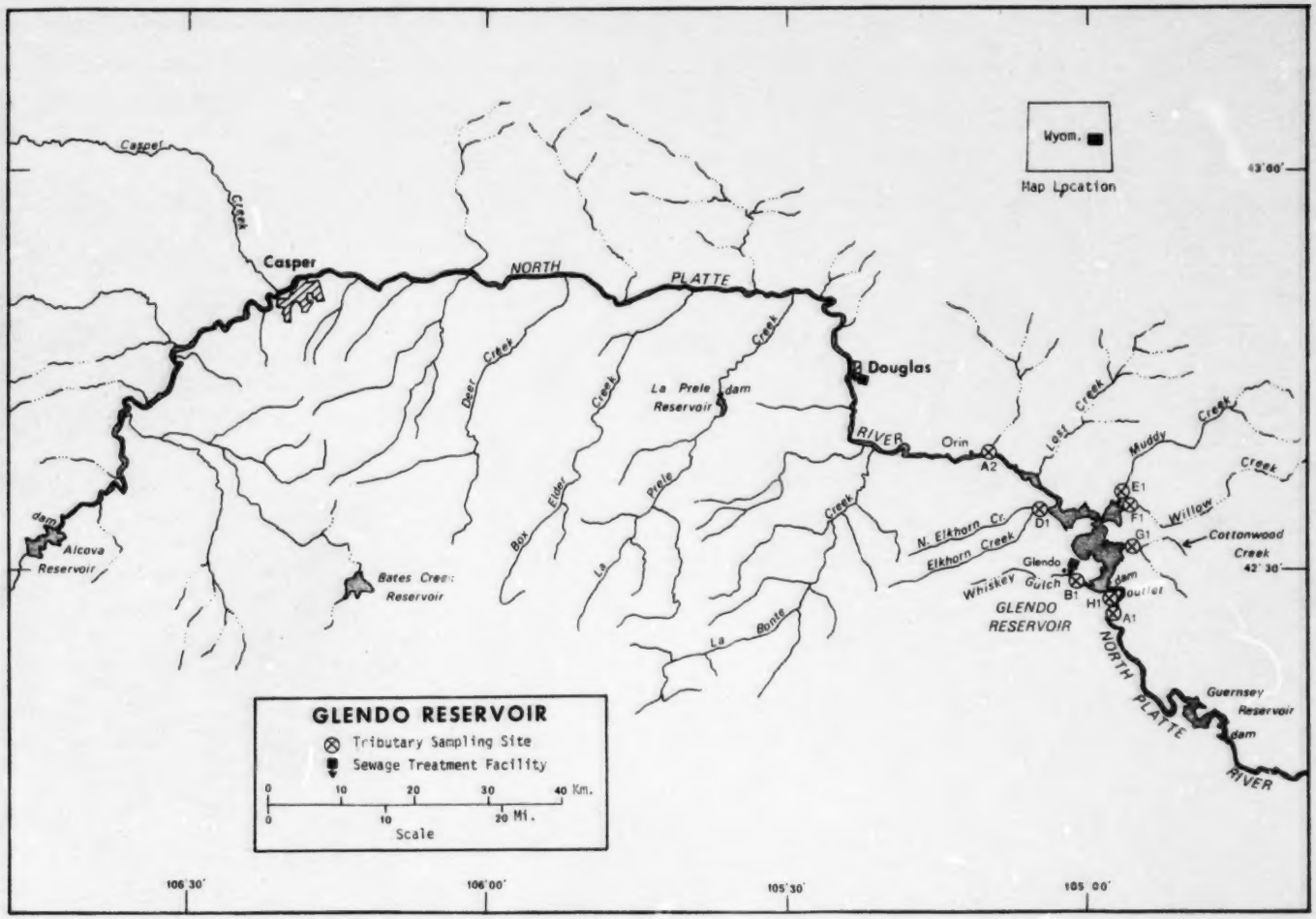
NATIONAL EUTROPHICATION SURVEY

STUDY RESERVOIRS

State of Wyoming

NAME	COUNTY
Big Sandy	Sublette, Sweetwater
Boulder	Sublette
Boysen	Fremont
De Smet	Johnson
Flaming Gorge	Sweetwater, WY; Daggett, UT
Fremont	Sublette
Glendo	Converse, Platte
Keyhole	Crook
Ocean	Fremont
Seminoe	Carbon
Soda	Sublette
Viva Naughton	Lincoln
Woodruff Narrows	Uinta
Yellowtail	Bighorn, WY; Bighorn, Carbon, MT


Douglas
Wyom.
Map Location
Lost Springs
42°45'
Creek
Creek
North
Platte
Orin
A2
River
Lost
Muddy
Creek
La Bonte
Creek
E1
F1
D1
North Elkhorn
Creek
Willow
Creek
Elkhorn
Creek
07
03
Cottonwood
Creek
02
G1
GLENDO RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
0 5 10 15 Km.
0 2 4 6 8 Mi.
Scale
Glendo
Whiskey
Gulch
42°30'
B1
dam
GLENDO
RESERVOIR
H1
aqueduct
A1
outlet
North Platte River
105°15'
105°00'
104°45'


Wyom.
Map Location
43°00'
Casper Creek
Casper
NORTH PLATTE RIVER
Douglas
Deer Creek
Box Elder Creek
La Prele Creek
La Prele dam
Reservoir
Orin
A2
Lost Creek
Muddy Creek
Willow Creek
E1
F1
G1
D1
N. Elkhorn Cr.
Elkhorn Creek
Cottonwood Creek
42°30'
Glendo
Whiskey Gulch
B1
H1
A1
dam
outlet
GLENDO RESERVOIR
Guernsey Reservoir
dam
NORTH PLATTE RIVER
dam
Alcova Reservoir
Bates Creek Reservoir
La Bonte Creek
GLENDO RESERVOIR
Tributary Sampling Site
Sewage Treatment Facility
0 10 20 30 40 Km.
0 10 20 Mi.
Scale
106°30'
106°00'
105°30'
105°00'

GLENDO RESERVOIR

STORET NO. 5607

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Glendo Reservoir is eutrophic. It ranked twelfth in overall trophic quality when the 14 Wyoming lakes and reservoirs sampled in 1975 were compared using a combination of six parameters*. Nine of the waterbodies had less median total phosphorus, 12 had less median inorganic nitrogen, seven had less and two the same median dissolved orthophosphorus, ten had less mean chlorophyll a, and nine had greater mean Secchi disc transparency. Marked depression of dissolved oxygen with depth occurred at station 1 in August.

Survey limnologists observed emergent aquatic plants along much of the shoreline in May.

B. Rate-Limiting Nutrient:

The results of the algal assays indicate that Glendo Reservoir was phosphorus limited at the times the samples were taken (05/22/75 and 10/14/75).

The reservoir data indicate phosphorus limitation all three sampling times.

C. Nutrient Controllability:

1. Point Sources--Known point sources contributed 1.5% of the total phosphorus load to the reservoir during the sampling

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* See Appendix A.

year. The town of Glendo contributed 0.1% of the total, and Douglas added 1.4%. Septic tanks serving near-shore dwellings were estimated to have contributed less than 0.1% of the total, but a shoreline survey is needed to determine the actual significance of those sources.

The present phosphorus loading of 3.24 $g/m^2/yr$ is more than three times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 12). Because of this, all phosphorus inputs to Glendo Reservoir should be minimized to the greatest possible extent to slow the aging of the reservoir.

2. Non-point sources--Non-point sources, including precipitation, accounted for 98.5% of the total phosphorus load to the reservoir during the sampling year. The North Platte River contributed 97.8% of the total, and the minor tributaries and immediate drainage added less than 0.1%.

The non-point phosphorus export rate of the North Platte River was 4 $kg/km^2/yr$ (see page 11). Unsampled point sources may have contributed to this export. The cities of Casper (population = 39,000) and Glenrock (population = 1,600) discharge to the North Platte River 100 to 130 km upstream from Glendo Reservoir and may be contributing a significant nutrient load.

II. RESERVOIR AND DRAINAGE BASIN CHARACTERISTICS†

A. Morphometry††:

1. Surface area: 53.97 kilometers^2.
2. Mean depth: 18.3 meters.
3. Maximum depth: 64.6 meters.
4. Volume: 987.651 x 10^6 m^3.
5. Mean hydraulic retention time: 264 days (based on outflow).

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
North Platte River	48,813.7	47.060
Whiskey Gulch	25.9	0.007
Elkhorn Creek	150.2	0.007
Cottonwood Creek	64.7	0.006
Minor tributaries & immediate drainage -	1,414.6	0.033
Totals	50,469.1	47.113

2. Outlet -

North Platte River	50,523.1**	43.340**

C. Precipitation***:

1. Year of sampling: 23.34 centimeters.
2. Mean annual: 31.70 centimeters

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† Table of metric conversions--Appendix B
†† Prior, 1974.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of reservoir; lesser outflow due to evaporation.
*** See Working Paper No. 175.

III. WATER QUALITY SUMMARY

Glendo Reservoir was sampled three times during the open-water season of 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at stations 1 and 2 (because of reservoir drawdown, five other stations were sampled only once; see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first and last visits, 18.9-liter depth-integrated samples were composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 20.1 meters at station 1, 21.9 meters at station 2, 7.9 meters at station 3, 6.7 meters at station 4, 3.7 meters at station 5, and near-surface only at stations 6 and 7.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR GLENDO RESERVOIR
STORET CODE 5607

PARAMETER	1ST SAMPLING (5/22/75) 5 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (8/27/75) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (10/14/75) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	7.2 - 12.5	10.0	10.1	17.8 - 21.0	19.4	19.5	10.1 - 12.5	12.0	12.2
DISS OXY (MG/L)	8.2 - 10.0	9.3	9.5	2.4 - 9.0	5.9	6.1	6.6 - 8.0	7.4	7.5
CNDCTVY (MCROMO)	310. - 564.	473.	521.	480. - 567.	543.	554.	486. - 533.	511.	511.
PH (STAND UNITS)	8.3 - 8.7	8.5	8.6	8.0 - 8.7	8.3	8.3	8.0 - 8.4	8.3	8.3
TOT ALK (MG/L)	101. - 156.	139.	148.	142. - 156.	145.	144.	151. - 155.	152.	152.
TOT P (MG/L)	0.024 - 0.248	0.065	0.041	0.034 - 0.092	0.055	0.054	0.038 - 0.053	0.043	0.043
ORTHO P (MG/L)	0.002 - 0.034	0.013	0.007	0.010 - 0.053	0.021	0.017	0.007 - 0.019	0.015	0.016
NO2+NO3 (MG/L)	0.160 - 0.370	0.271	0.280	0.060 - 1.000	0.244	0.170	0.050 - 0.150	0.115	0.120
AMMONIA (MG/L)	0.040 - 0.090	0.056	0.050	0.020 - 0.340	0.090	0.050	0.030 - 0.140	0.104	0.110
KJEL N (MG/L)	0.300 - 0.800	0.480	0.500	0.200 - 0.900	0.550	0.550	0.400 - 0.500	0.437	0.400
INORG N (MG/L)	0.200 - 0.420	0.327	0.350	0.080 - 1.030	0.334	0.265	0.080 - 0.290	0.219	0.230
TOTAL N (MG/L)	0.560 - 1.080	0.751	0.755	0.340 - 1.300	0.794	0.755	0.450 - 0.640	0.552	0.545
CHLRPYL A (UG/L)	2.8 - 7.2	4.8	4.6	3.7 - 26.3	13.5	10.5	5.5 - 14.3	9.6	8.9
SECCHI (METERS)	0.3 - 3.7	1.8	1.6	0.1 - 0.4	0.3	0.4	0.3 - 0.6	0.5	0.5

Reproduced from best available copy.

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
05/22/75	1. Diatoma sp.	645
	2. Stephanodiscus sp.	469
	3. Cryptomonas sp.	293
	4. Asterionella sp.	176
	5. Navicula sp.	59
	Other genera	116
	Total	1758
08/27/75	1. Aphanizomenon sp.	2407
	2. Navicula sp.	193
	3. Diatoma sp.	48
	4. Rhoicosphenia sp.	48
	5. Scenedesmus sp.	48
	Total	2744
10/14/75	1. Navicula sp.	440
	2. Melosira sp.	439
	3. Diatoma sp.	275
	4. Chroomonas (?) sp.	275
	5. Stephanodiscus sp.	165
	Other genera	163
	Total	1757

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/22/75	1	2.8
	2	3.6
	3	7.2
	4	5.8
	5	4.6
	6	-
	7	-

Sampling Date	Station Number	Chlorophyll a (µg/l)
08/27/75	1	3.7
	2	26.3
	3	-
	4	-
	5	-
	6	10.5
	7	-
10/14/75	1	5.5
	2	8.9
	3	-
	4	-
	5	-
	6	-
	7	14.3

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. May sample

1). Stations 1, 2, and 3 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.005	0.310	1.1
0.050 P	0.055	0.310	14.1
0.050 P + 1.0 N	0.055	1.310	17.3
1.0 N	0.005	1.310	1.1

2). Stations 4 and 5 -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.025	0.430	5.3
0.050 P	0.075	0.430	17.8
0.050 P + 1.0 N	0.075	1.430	30.5
1.0 N	0.025	1.430	4.4

b. October sample (stations 1, 2, and 7) -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.005	0.175	0.6
0.050 P	0.055	0.175	13.4
0.050 P + 1.0 N	0.055	1.175	19.5
1.0 N	0.005	1.175	0.6

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity of Glendo Reservoir was moderately high to high in May (depending on the stations) and moderate in October. Also, there was a significant growth response in all assays with the addition of phosphorus alone but no response when only nitrogen was added. Therefore, phosphorus limitation is indicated.

The reservoir data support the assay findings. The mean inorganic nitrogen to orthophosphorus ratios were 25 to 1 in May, 16 to 1 in August, and 15 to 1 in October. Phosphorus limitation is expected when the N to P ratio is greater than 13 to 1.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Wyoming National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the maps (pages v and vi), except for the high runoff months of May, June, and July when two samples were collected at four of the sites. Sampling was begun in October, 1974, and was completed in September, 1975.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Wyoming District Office of the U.S. Geological Survey for the tributary sites nearest the reservoir.

In this report, nutrient loads for sampled tributaries were calculated using mean annual concentrations and mean annual flows. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the concentrations in Muddy Creek and Willow Creek at stations E1 and F1 and the mean annual ZZ flow.

The operator of the Douglas wastewater treatment plant provided monthly effluent samples and corresponding flow data. The operator of the Glendo plant provided effluent samples but could not provide flow data. Therefore, nutrient loads were estimated at 1.134 P and 3.401 N/capita/year, and flows were estimated at 0.3785 m^3/capita/day.

A. Waste Sources:

1. Known municipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Douglas*	2,677	stab. pond	1324.9	North Platte River
Glendo**	210***	trick. filter	79.5	Whiskey Gulch

2. Known industrial - (None)

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
North Platte River	171,200	97.8
b. Minor tributaries & immediate drainage (non-point load)† -	125	<0.1
c. Known municipal STP's -		
Glendo	240	0.1
Douglas	2,440	1.4
d. Septic tanks†† -	5	<0.1
e. Known industrial - None	-	-
f. Direct precipitation††† -	945	0.6
Total	174,955	100.0

2. Outputs -

Reservoir outlet - North Platte River 49,205

3. Net annual P accumulation - 127,750 kg.

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* Treatment plant questionnaire.
** Anonymous, 1971.
*** 1970 census.
† Includes Whiskey Gulch, Elkhorn Creek, and Cottonwood Creek because limited numbers of samples were collected from those streams.
†† Estimate based on 10 shoreline dwellings; see Working Paper No. 175.
††† See working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
North Platte River	2,182,305	96.8
b. Minor tributaries & immediate drainage (non-point load)* -	3,070	0.1
c. Known municipal STP's -		
Glendo	715	<0.1
Douglas	8,205	0.4
d. Septic tanks** -	105	<0.1
e. Known industrial - None	-	-
f. Direct precipitation*** -	58,265	2.6
Total	2,252,665	100.0

2. Outputs -

Reservoir outlet - North Platte River 1,742,630

3. Net annual N accumulation - 510,035 kg.

D. Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
North Platte River	4	45

* Includes Whiskey Gulch, Elkhorn Creek, and Cottonwood Creek because limited numbers of samples were collected from those streams.
** Estimate based on 10 shoreline dwellings; see Working Paper No. 175.
*** See Working Paper No. 175.

E. Mean Nutrient Concentrations in Ungaged Streams:

Tributary	Mean Total P Conc. (mg/l)	Mean Total N Conc. (mg/l)
Muddy Creek	0.068	1.772
Willow Creek	0.084	1.903

F. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	3.24	2.37	41.7	9.5

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Glendo Reservoir:

"Dangerous" (eutrophic loading)	0.96
"Permissible" (oligotrophic loading)	0.48

V. LITERATURE REVIEWED

Anonymous, 1971. Inventory of municipal waste facilities. EPA Pub. OWP-1, vol. 8, Wash., DC.

Prior, Roy E, 1974. Personal communication (reservoir morphometry). WY Dept. of Env. Qual., Cheyenne.

Vollenweider, R.A. and P.J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
5601	BIG SANDY RESERVOIR	0.087	0.060	487.667	4.383	8.800	0.020
5602	BOULDER LAKE	0.008	0.040	361.800	2.483	8.400	0.002
5603	BOYSEN RESERVOIR	0.037	0.140	465.923	6.264	14.400	0.014
5604	LAKE DE SMET	0.033	0.040	409.000	11.167	9.400	0.006
5605	FLAMING GORGE RESERVOIR	0.014	0.605	366.461	5.611	12.200	0.003
5606	FREMONT LAKE	0.006	0.040	-22.000	3.783	7.400	0.002
5607	GLENDO RESERVOIR	0.045	0.315	459.182	8.473	12.600	0.014
5608	KEY HOLE RESERVOIR	0.028	0.050	454.583	7.792	14.000	0.004
5609	OCEAN LAKE	0.043	0.040	478.333	7.500	8.600	0.004
5610	SEMINOLE RESERVOIR	0.030	0.130	447.000	2.536	11.000	0.007
5611	SODA LAKE	0.063	0.040	387.500	5.575	15.000	0.014
5612	VIVA NAUGHTON RESERVOIR	0.065	0.120	430.000	25.067	13.200	0.024
5613	WOODRUFF NARROWS RESERVO	0.069	0.105	470.000	12.950	13.200	0.019
5614	YELLOWTAIL RESERVOIR	0.026	0.310	364.500	5.410	10.000	0.017

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
5601	BIG SANDY RESERVOIR	0 (0)	54 (7)	0 (0)	77 (10)	77 (10)	8 (1)	216
5602	BOULDER LAKE	92 (12)	92 (11)	92 (12)	100 (13)	92 (12)	92 (12)	560
5603	BOYSEN RESERVOIR	46 (6)	23 (3)	23 (3)	46 (6)	8 (1)	42 (5)	188
5604	LAKE DE SMET	54 (7)	73 (9)	62 (8)	15 (2)	69 (9)	62 (8)	335
5605	FLAMING GORGE RESERVOIR	85 (11)	0 (0)	77 (10)	54 (7)	46 (6)	85 (11)	347
5606	FREMONT LAKE	100 (13)	73 (9)	100 (13)	85 (11)	100 (13)	100 (13)	558
5607	GLENDO RESERVOIR	31 (4)	8 (1)	31 (4)	23 (3)	38 (5)	42 (5)	173
5608	KEY HOLE RESERVOIR	69 (9)	62 (8)	38 (5)	31 (4)	15 (2)	69 (9)	284
5609	OCEAN LAKE	38 (5)	92 (11)	8 (1)	38 (5)	85 (11)	77 (10)	338
5610	SEMINOLE RESERVOIR	62 (8)	31 (4)	46 (6)	92 (12)	54 (7)	54 (7)	339
5611	SODA LAKE	23 (3)	92 (11)	69 (9)	62 (8)	0 (0)	31 (4)	277
5612	VIVA NAUGHTON RESERVOIR	15 (2)	38 (5)	54 (7)	0 (0)	27 (3)	0 (0)	134
5613	WOODRUFF NARROWS RESERVO	8 (1)	46 (6)	15 (2)	8 (1)	27 (3)	15 (2)	119
5614	YELLOWTAIL RESERVOIR	77 (10)	15 (2)	85 (11)	69 (9)	62 (8)	23 (3)	331

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	5602	BOULDER LAKE	560
2	5606	FREMONT LAKE	558
3	5605	FLAMING GORGE RESERVOIR	347
4	5610	SEMINOLE RESERVOIR	339
5	5609	OCEAN LAKE	338
6	5604	LAKE DE SMET	335
7	5614	YELLOWTAIL RESERVOIR	331
8	5608	KEY HOLE RESERVOIR	284
9	5611	SODA LAKE	277
10	5601	BIG SANDY RESERVOIR	216
11	5603	BOYSEN RESERVOIR	188
12	5607	GLENDO RESERVOIR	173
13	5612	VIVA NAUGHTON RESERVOIR	134
14	5613	WOODRUFF NARROWS RESERVO	119

APPENDIX B

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR WYOMING 08/05/76

LAKE CODE 5607 GLENDO RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 50523.1

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
5607A1	50523.1	0.59	2.97	13.85	27.38	61.50	70.00	128.56	137.34	71.47	1.42	0.23	0.68	43.34
5607A2	48813.7	26.22	29.48	32.71	53.63	92.23	75.95	50.74	46.13	36.84	32.37	61.79	26.25	47.06
5607B1	25.9	0.0	0.0	0.028	0.028	0.028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.007
5607D1	150.2	0.0	0.0	0.028	0.028	0.028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.007
5607G1	64.7	0.0	0.0	0.014	0.028	0.028	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.006
5607ZZ	1476.3	0.028	0.028	0.028	0.028	0.057	0.057	0.028	0.028	0.028	0.028	0.028	0.028	0.033

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 50523.1
SUM OF SUB-DRAINAGE AREAS = 50530.9

TOTAL FLOW IN = 564.96
TOTAL FLOW OUT = 515.99

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW
5607A1	10	74	0.198	7	0.255		
	11	74	0.057	4	0.057		
	12	74	0.057				
	1	75	0.085				
	2	75	0.113	6	0.170		
	3	75	0.481	3	0.085		
	4	75	25.995	3	40.210		
	5	75	73.709	8	62.580	21	102.790
	6	75	72.208	5	88.065	25	82.402
	7	75	149.796	8	173.016	25	144.699
	8	75	146.398	7	146.964		
	9	75	86.933	4	130.257		
5607A2	10	74	37.661	7	37.945		
	11	74	39.077	4	39.360		
	12	74	33.414	3	39.360		
	1	75	26.335				
	2	75	31.149				
	3	75	29.166	3	39.644		
	4	75	42.475				
	5	75	63.147	8	41.626	21	83.535
	6	75	63.996	5	71.358	25	62.297
	7	75	52.952	8	53.802	25	53.802
	8	75	83.252	7	52.952		
	9	75	71.075	4	109.303		

TRIBUTARY FLOW INFORMATION FOR WYOMING 08/05/76

LAKE CODE 5607 GLENDO RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5607B1	10	74	0.0						
	11	74	0.0						
	12	74	0.0						
	1	75	0.0						
	2	75	0.0						
	3	75	0.0						
	4	75	0.0						
	5	75	0.0						
	6	75	0.0						
	7	75	0.0						
	8	75	0.0						
	9	75	0.0						
5607D1	10	74	0.0						
	11	74	0.0						
	12	74	0.0						
	1	75	0.0						
	2	75	0.0						
	3	75	0.0						
	4	75	0.0						
	5	75	0.0						
	6	75	0.0						
	7	75	0.0						
	8	75	0.0						
	9	75	0.0						
5607G1	10	74	0.0						
	11	74	0.0						
	12	74	0.0						
	1	75	0.0						
	2	75	0.0						
	3	75	0.0						
	4	75	0.0						
	5	75	0.0						
	6	75	0.0						
	7	75	0.0						
	8	75	0.0						
	9	75	0.0						
5607ZZ	10	74	0.028						
	11	74	0.028						
	12	74	0.028						
	1	75	0.028						
	2	75	0.028						
	3	75	0.028						
	4	75	0.028						
	5	75	0.028						
	6	75	0.028						
	7	75	0.028						
	8	75	0.028						
	9	75	0.028						

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APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/08/05

560701
42 28 38.0 104 57 12.0 3
GLENDO RESERVOIR
56031 WYOMING

090991

11EPALES 2111202
0032 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/22	14 40	0000	11.3	9.8	144	564	8.50	155	0.090	0.800	0.280	0.007
	14 40	0005	10.9	9.4		555	8.55	155	0.080	0.500	0.280	0.008
	14 40	0015	10.3	9.4		548	8.60	154	0.080	0.400	0.280	0.007
	14 40	0028	10.1	9.2		544	8.60	156	0.080	0.500	0.280	0.008
75/08/27	11 55	0000	20.5	5.8	16	567	8.10	156	0.040	0.200	0.140	0.018
	11 55	0005	20.0	6.2		559	8.30	142	0.030	0.300	1.000	0.012
	11 55	0015	19.9	5.2		551	8.25	143	0.060	0.400	0.160	0.018
	11 55	0040	19.2	3.6		539	8.15	146	0.180	0.500	0.190	0.035
	11 55	0066	18.2	2.4		539	8.00	148	0.340	0.900	0.180	0.053
75/10/14	12 10	0000	12.5	6.8	24	502	8.20	152	0.130	0.400	0.140	0.017
	12 10	0005	12.5	7.8		502	8.25	151	0.140	0.400	0.140	0.019
	12 10	0015	12.4	7.6		507	8.30	151	0.140	0.500	0.140	0.017
	12 10	0031	12.4	7.4		525	8.30	151	0.140	0.400	0.150	0.018

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/22	14 40	0000	0.031	2.8	
	14 40	0005	0.031		
	14 40	0015	0.035		
	14 40	0028	0.056		
75/08/27	11 55	0000	0.039	3.7	
	11 55	0005	0.034		
	11 55	0015	0.039		
	11 55	0040	0.062		
	11 55	0066	0.092		
75/10/14	12 10	0000	0.045	5.5	
	12 10	0005	0.039		
	12 10	0015	0.039		
	12 10	0031	0.038		

STORET RETRIEVAL DATE 76/08/05

560702
42 31 52.0 104 58 32.0 3
GLENDO RESERVOIR
56031 WYOMING

090991

11EPALES 2111202
0076 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/22	15 00	0000	10.9	9.8	120	530	8.60	148	0.060	0.600	0.260	0.006
	15 00	0005	10.1	9.6		532	8.60	156	0.060	0.600	0.260	0.006
	15 00	0025	9.8	9.3		519	8.60	153	0.060	0.500	0.270	0.005
	15 00	0048	8.9	9.6		532	8.60	156	0.060	0.400	0.230	0.005
	15 00	0072	7.2	9.8		519	8.65	150	0.060	0.500	0.260	0.005
75/08/27	13 30	0000	21.0	9.0	15	558	8.70	143	0.020	0.900	0.060	0.016
	13 30	0005	19.7	7.8		557	8.60	144	0.020	0.600	0.080	0.010
	13 30	0015	19.4	7.2		560	8.60	145	0.030	0.500	0.110	0.012
	13 30	0038	17.8	6.0		524	8.30	144	0.090	0.600	0.220	0.020
75/10/14	12 40	0000	12.0	6.6	20	515	8.40	153	0.090	0.400	0.100	0.012
	12 40	0005	12.0	7.6		533	8.45	152	0.080	0.500	0.100	0.016
	12 40	0016	11.9	7.4		520	8.05	153	0.080	0.500	0.100	0.012

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/22	15 00	0000	0.030	3.6	
	15 00	0005	0.045		
	15 00	0025	0.034		
	15 00	0048	0.024		
	15 00	0072	0.030		
75/08/27	13 30	0000	0.073	26.3	
	13 30	0005	0.054		
	13 30	0015	0.050		
	13 30	0038	0.054		
75/10/14	12 40	0000	0.045	8.9	
	12 40	0005	0.053		
	12 40	0016	0.045		

STORET RETRIEVAL DATE 76/08/05

560703
42 34 27.0 104 57 18.0 3
GLENDO RESERVOIR
56031 WYOMING
090991

11EPALES 2111202
0030 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/22	15 25	0000	10.8	10.0	63	513	8.65	141	0.040	0.500	0.250	0.005
	15 25	0005	10.2	9.8		525	8.70	148	0.040	0.400	0.160	0.003
	15 25	0015	9.6	9.6		527	8.65	149	0.040	0.500	0.170	0.002
	15 25	0026	8.9	9.6		522	8.70	147	0.040	0.400	0.170	0.005

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/22	15 25	0000	0.038	7.2	
	15 25	0005	0.031		
	15 25	0015	0.029		
	15 25	0026	0.054		

25

STORET RETRIEVAL DATE 76/08/05

560704
42 34 11.0 105 02 27.0 3
GLENDO RESERVOIR
56031 WYOMING
090991

11EPALES 2111202
0026 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/22	15 40	0000	12.5	9.4	21	436	8.50	124	0.050	0.500	0.300	0.023
	15 40	0005	11.5	8.4		418	8.45	124	0.050	0.400	0.300	0.024
	15 40	0015	10.8	8.4		382	8.40	118	0.050	0.400	0.300	0.026
	15 40	0022	10.5	8.4		355	8.45	124	0.050	0.400	0.300	0.023

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/22	15 40	0000	0.072	5.8	
	15 40	0005	0.071		
	15 40	0015	0.077		
	15 40	0022	0.070		

STORET RETRIEVAL DATE 76/08/05

560705
42 36 22.0 105 04 50.0 3
GLENDO RESERVOIR
56031 WYOMING

090991

11EPALES 2111202
0016 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 N02&N03 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/05/22	16 00	0000	9.0	8.2	10	310	8.30	101	0.040	0.600	0.360	0.034
	16 00	0005	9.0	9.2		310	8.25	103	0.050	0.400	0.370	0.033
	16 00	0012	8.6	9.8		312	8.30	110	0.050	0.300	0.340	0.028

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/05/22	16 00	0000	0.139	4.6	
	16 00	0005	0.248		
	16 00	0012	0.147		

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STORET RETRIEVAL DATE 76/08/05

560706
42 33 54.0 104 58 20.0 3
GLENDO RESERVOIR
56031 WYOMING

11EPALES 760109 2111202
0999 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/08/27	14 00	0000	18.0	6.2	4	480	8.25	142	0.090	0.600	0.300	0.016

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/08/27	14 00	0000	0.055	10.5	

STORET RETRIEVAL DATE 76/08/05

560707
42 33 38.0 104 58 36.0 3
GLENDO RESERVOIR
56031 WYOMING

11EPALES 760109 2111202
0005 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
75/10/14	13 00	0000	10.1	8.0	12	486	8.40	155	0.030	0.400	0.050	0.007

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L	00031 INCDT LT REMNING PERCENT
75/10/14	13 00	0000	0.042	14.3	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 76/08/05

S607A1
42 27 30.0 104 56 45.0 4
N PLATTE RIVER
56 7.5 CASSA
O/GLENDO RESERVOIR 090991
BNK FRM UNPVD RD 1 MI SE OF POWERHOUSE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/07	13	05	0.040	1.200	0.020	0.005	0.015
74/11/04	14	30	0.072	1.600	0.046	0.025	0.050
75/02/06	13	40	0.416	1.000	0.056	0.016	0.030
75/03/03	10	55	0.420	0.750	0.020	0.015	0.020
75/04/03	14	40	0.330	0.650	0.070	0.010	0.040
75/05/08	10	35	0.332	0.600	0.021	0.015	0.030
75/05/21	11	40	0.280	0.300	0.045	0.010	0.020
75/06/05	11	25	0.250	0.800	0.230	0.037	0.040
75/06/25	10	35	0.260	1.900	0.095	0.025	0.039
75/07/08	13	31	0.210	0.900	0.080	0.020	0.030
75/07/25	14	30	0.160	1.150	0.085	0.020	0.040
75/08/07	13	15	0.170	1.200	0.030	0.010	0.040
75/09/04	10	30	0.080	1.500	0.045	0.010	0.070

STORET RETRIEVAL DATE 76/08/05

560742
42 41 02.0 105 09 50.0 4
N PLATTE RIVER
56 7.5 ORIN
T/GLENDO RESERVOIR 090991
FROM BRDG 1 MI ESE ORIN JCT ON US RT 87
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/07	08 00		0.336	0.800	0.015	0.010	0.025
74/11/04	10 45		0.720	1.000	0.035	0.035	0.070
74/12/03	09 30		0.480	1.150	0.020	0.030	0.065
75/03/03	09 45		0.560	0.750	0.040	0.065	0.130
75/05/08	09 15		0.315	1.000	0.025	0.045	0.110
75/05/21	10 30		0.270	0.850	0.021	0.052	0.240
75/06/05	08 45		0.330	1.400	0.030	0.040	0.150
75/06/25	09 25		0.140	1.600	0.040	0.015	0.080
75/07/08	16 25		0.165	1.900	0.040	0.025	0.170
75/07/25	15 35		0.210	1.200	0.025	0.030	0.130
75/08/07	15 25		0.045	0.825	0.025	0.015	0.095
75/09/04	09 00		0.270	1.400	0.020	0.035	0.140

STOPET RETRIEVAL DATE 76/08/05

S607B1
42 29 10.0 105 00 40.0 4
WHISKEY GULCH
56 7.5 SIBLEY PEAK
T/GLENDO RESERVOIR 090991
BRDG ON SIOUX SHORELINE DRIVE
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
75/05/08	08 30		0.015	4.600	0.045	0.090	0.480
75/05/21	11 10			5.750			1.250
75/07/25	14 45		0.020	4.800	0.135	0.500	0.780

STORET RETRIEVAL DATE 76/08/05

5607D1
42 34 35.0 105 04 15.0 4
ELKHORN CREEK
56 7.5 GLENDO
T/GLENDO RESERVOIR 090991
100 FT FRM END DIRT RD 6 MI NNW GLENDO
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
75/05/08	09 35		0.037	0.400	0.017	0.010	0.010
75/05/21	10 50		0.060	0.100	0.015	0.010	0.010

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STORET RETRIEVAL DATE 76/08/05

5607E1
42 36 08.0 104 56 25.0 4
MUDDY CREEK
56 7.5 JEWEL SPRNGS
T/GLENDO RESERVOIR 090991
DIRT RD BRDG 5.5 MI NNW FROM END PAVEMNT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/07	12	10	0.016	1.900	0.027	0.012	0.045
74/11/04	13	55	0.056	1.900	0.060	0.020	0.050
74/12/03	10	45	0.256	1.900	0.065	0.020	0.040
75/01/02	10	20	0.384	0.800	0.072	0.030	0.050
75/02/06	14	20	0.408	1.100	0.128	0.048	0.100
75/03/03	11	40	0.200	1.100	0.075	0.060	0.120
75/04/03	11	35	0.165	2.100	0.070	0.035	0.090
75/05/08	14	00	0.035	1.000	0.025	0.030	0.050
75/05/21	14	05	0.010	0.700	0.020	0.010	0.050
75/06/05	10	20	0.010	1.530	0.030	0.033	0.045
75/06/25	11	40	0.010	1.800	0.030	0.010	0.040
75/07/08	11	35	0.015	2.300	0.050	0.025	0.060
75/07/25	13	50	0.015	3.150	0.065	0.045	0.120
75/08/07	14	20	0.005	1.100	0.030	0.010	0.060
75/09/04	11	15	0.010	2.600	0.040	0.015	0.100

STORET RETRIEVAL DATE 76/08/05

5607F1
42 35 09.0 104 55 37.0 4
WILLOW CREEK
56 7.5 JEWEL SPRNGS
T/GLENDO RESERVOIR 090991
BRDG .8 MI W RUINS 2.8 MI NNW END PAVMNT
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
74/10/07	11	57	0.032	2.000	0.090	0.035	0.095
74/11/04	13	30	0.016	1.000	0.360	0.030	0.040
74/12/03	10	25	0.032	1.500	0.030	0.005	0.020
75/02/06	14	35	0.376	1.400	0.116	0.016	0.030
75/03/03	11	55	0.025	1.100	0.035	0.020	0.050
75/04/03	11	20	0.020	1.900	0.050	0.015	0.050
75/05/08	13	40	0.010	1.300	0.030	0.030	0.060
75/05/21	13	50	0.015	1.500	0.040	0.010	0.070
75/06/05	10	00	0.020	1.050	0.030	0.045	0.070
75/06/25	11	20	0.005	2.900	0.050	0.010	0.080
75/07/08	11	17	0.020	4.100	0.115	0.060	0.270
75/07/25	13	35	0.010	2.100	0.075	0.020	0.180
75/08/07	14	15	0.010	2.300	0.055	0.015	0.080

STORET RETRIEVAL DATE 76/08/05

S607G1
42 31 55.0 104 54 40.0 4
COTTONWOOD CREEK
56 7.5 JEWEL SPRNGS
T/GLENDO RESERVOIR 090991
CNTY RD BRDG .3 MI W OF CRANDALL DAM
11EPALES 2111204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
75/03/03	11	20	0.095	2.400	0.075	0.210	0.370
75/04/03	10	55	0.005	1.200	0.085	0.045	0.080
75/05/08	13	20	0.005	0.675	0.025	0.060	0.060
75/05/21	13	30	0.020	0.750	0.025	0.100	0.120
75/06/05	09	45	0.005	1.000	0.020	0.053	0.120

STORET RETRIEVAL DATE 76/08/05

5607AA PD5607AA P002677
42 44 00.0 105 23 30.0 4
DOUGLAS
56 7.5 CHALK BUTTES
T/GLENDO RES. 090991
PLATTE RIVER
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/02/10	14 30		0.080	26.600	13.900	5.200	9.100	0.320	0.350
75/04/10	15 30		0.020	19.000	6.700		7.600	0.320	0.350
75/05/08	11 00		0.050	20.000	0.260	2.600	3.800	0.320	0.350
75/06/09	15 00		0.200	16.000	0.790	5.200	7.400	0.320	0.350
75/07/08	14 00		0.150	5.900	0.130	1.200	1.200	0.320	0.350
75/07/28	14 00		0.175	13.500	0.150	2.300	3.000	0.320	0.350
75/09/25	14 00		0.075	17.000	0.230	1.800	3.200	0.320	0.350

STORET RETRIEVAL DATE 76/08/05

56078A PR5607BA P000210
42 30 00.0 105 01 30.0 4
GLENDO
56 7.5 GLENDO
T/GLENDO RES. 090991
WHISKEY GULCH
11EPALES 2141204
0000 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
75/02/07	11 00								
CP(T)-			0.080	42.000	38.000	7.900	9.000		
75/02/07	16 00								
75/03/21	08 00								
CP(T)-			0.160	44.000	34.000	5.700	13.000		
75/03/21	12 00								
75/04/25	11 00								
CP(T)-			0.300	90.000	28.800	6.300	21.000		
75/04/25	15 00								
75/07/24			1.000	49.000	31.000	10.000	14.000		
75/08/20	08 00								
CP(T)-			0.026	48.000	29.000	8.700	12.000		
75/08/20	15 00								
75/09/08	08 00								
CP(T)-			0.200	55.000	35.000	9.600	16.500		
75/09/08	14 00								
75/10/30	08 00								
CP(T)-			0.175	69.000	41.000	11.500	15.000		
75/10/30	12 00								
75/12/05	08 00								
CP(T)-			0.250	61.000	36.000	9.600	13.000		
75/12/05	13 00								